CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

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The North Rasmussen Ridge Supplemental Mine and Reclamation Plan (November 2001) modifies the North Rasmussen Ridge Mine and Reclamation Plan submitted on December 1, 2000. Agrium's Rasmussen Ridge Property involves Federal Phosphate Leases I-04375 and I-07619. Lease I-04375 contains 920 acres, and Lease I-07619 contains 437 acres, for a total of 1,357 acres. Lease I-04375 in its entirety and 200 acres of Lease I-07619 are located within the Caribou National Forest; the remaining 237 acres of Lease I-07619 are on state land **(Figure 2.1-1)**. The northeast quarter of the northeast quarter of Section 16, Township 6 South, Range 43 East of the Boise Meridian contains a portion of a State of Idaho mineral lease formerly held by P_4 Production LLC. A portion of the North Rasmussen ore body is located within that lease area. Agrium signed an agreement with P_4 (Agrium/P_4 Production Ore and Overburden Exchange Agreement) to acquire the mineral rights for this lease. The IDL has reissued the lease as Agrium State Lease Number 9313.

Two areas would be incorporated into the current federal leases via lease modifications to implement the Mine Plan as proposed. These areas are for pit disturbance and would require two 10.0-acre modifications. Applications for these modifications were submitted to the BLM on February 9, 2001. A State Temporary Use Permit would require a 2.5-acre permit for haul road disturbance. Agrium would apply for the State Temporary Use Permit later. The areas are described as follows:

Lease Modifications

Forest Service	Bureau of Land Management
Surface Owner	Mineral Rights

Township 6 South, Range 43 East, Boise Meridian, Caribou County, Idaho

Description	Acres	Use
Section 22 NE1/4 NE1/4 NW1/4	10.0	Pit Disturbance
Section 15 NE1/4 SW1/4 SW1/4	10.0	Pit Disturbance
Total	20.0 Acres	

State Temporary Use Permit

Idaho Department of Lands	Bureau of Land Management
Surface Owner	Mineral Rights

Township 6 South, Range 43 East, Boise Meridian, Caribou County, Idaho

Description	Acres	Use
Section 9 SW1/4 SW1/4 SE1/4 NE1/4	2.5	Haul Road
Total	2.5 Acres	

Figure 2.1-1 Site Location and Ownership

2.1 EXISTING OPERATIONS

The following sections describe existing operations at the Rasmussen Ridge Mine and exploration activities that defined the North Rasmussen Ridge ore reserve.

2.1.1 Project History

Phosphate mining began at Rasmussen Ridge when Rhone-Poulenc Basic Chemicals Company built the South Rasmussen Ridge Mine and ore haulroad on Federal Lease I-04375 in 1991. An Environmental Assessment (EA) and Finding of No Significant Impact were jointly prepared in 1990 by the USFS – Soda Springs Ranger District, and the BLM – Pocatello Resource Area, Idaho Falls District. The environmental analyses supported the BLM leasing administration and the Caribou National Forest Special Use Permit process. The phosphate ore was shipped over a 4.1-mile haul road to the existing Wooley Valley Mine and then by conveyor and rail to Rhone-Poulenc's elemental phosphorus plant in Silverbow, Montana. The mine plan envisioned mining at Rasmussen Ridge in three phases along a 5-mile reach of Rasmussen Ridge: (1) South Rasmussen Ridge, (2) Central Rasmussen Ridge, and (3) North Rasmussen Ridge. The South mine plan involved disturbing 195 acres and complete backfilling of the pit, and was to last for 15 years. Rhone-Poulenc planned to complete mining at Wooley Valley and move the operations to Rasmussen Ridge.

In 1993, Rhone-Poulenc contracted with Nu-West Industries in Soda Springs to supply ore to the Nu-West fertilizer plant, as well as continuing to supply its phosphorus plant in Montana. This contract required Rhone-Poulenc to expand the mine to 257 acres of disturbance (**Table 2.1-1** and **Figure 2.1-2**). The South Rasmussen Ridge Mine Plan was further amended in 1996 when Rhone-Poulenc applied for approval of the Central Rasmussen Ridge Mine. At that time, all ore was being shipped to the Agrium (Nu-West Industries, Inc.) fertilizer plant in Soda Springs because the elemental phosphorus plant in Montana was idled in 1995. The 1996 amendment also involved an additional 80 acres that were added to Federal Lease I-07619. The Mine and Reclamation Plan for Central Rasmussen Ridge involved backfilling all but 35 acres of the pit (unless waste material became available from North Rasmussen Ridge) and disturbance of 231 acres (**Table 2.1-1** and **Figure 2.1-2**).

In January 1998, Agrium purchased the Rasmussen Ridge leases and the associated Special Use Permits from Rhodia (formerly Rhone-Poulenc). Agrium has been operating the Rasmussen Ridge Mine since March 1998 with Washington Group International, Inc. (formerly Morrison Knudsen) providing contract mining services. Agrium is currently mining the Central Rasmussen portion of the property under the Modified Central Rasmussen Ridge Mine and Reclamation Plan, which was approved by the BLM on February 17, 1999.

Current mining at the Central Rasmussen Ridge mine is conducted using the same mining methods as were used at the South Rasmussen Ridge Mine: an open pit with a retreating haul ramp and a haulage road along the east side. Most overburden waste is used as backfill in the South and Central Rasmussen Ridge mines. Ore produced by the Central Rasmussen Ridge Mine is hauled by truck to the Wooley Valley tipple, where it is loaded on rail cars for travel to Agrium's Conda Phosphate Operations. Current mining is conducted under the approved Central Rasmussen Ridge Modified Mine and Reclamation Plan, which specifies the BMPs and conditions of approval, mitigation measures, and conditions that were stipulated as part of the approval. **Table 1.2-1** presents the regulatory framework that controls current and proposed mining.

TABLE 2.1-1
EXISTING SURFACE DISTURBANCE AT CENTRAL RASMUSSEN RIDGE AND SOUTH RASMUSSEN RIDGE MINES

Affected Areas	Central Rasmussen Ridge		South Rasmussen Ridge	
	Total Acreage Disturbed	Total Acreage Reclaimed	Total Acreage Disturbed	Total Acreage Reclaimed
Mine Pits	138.9	103.9	107.5	107.5
External Waste	36.3	36.3	72.6	72.6
Haul Roads	45.1	45.1	62.4	62.4
Topsoil Stockpile	7.3	7.3	3.7	3.7
Water Control & Other	3.2	3.2	10.8	10.8
TOTAL	230.8	195.8	257.0	257.0

2.1.2 Geology and Exploration

Typical of the southeast Idaho area, North Rasmussen phosphate occurs in the Meade Peak Member of the Permian-aged Phosphoria Formation. The Meade Peak Member is overlain by chert from the Rex Chert Member of the Phosphoria Formation. It is underlain by dolomite from the Permian-aged Grandeur Tongue of the Park City Formation and limestone and sandstones from the Pennsylvanian-aged Wells Formation. The mineable phosphate rock occurs in two separate ore zones (the upper ore and lower ore) separated by 60 to 100 feet of center waste shales.

The lower ore varies in thickness throughout the property but averages 40 feet. The thickness of the upper ore also varies throughout the property and averages 16 feet. A stratigraphic column that shows the location and general quality of the individual ore beds is shown in **Figure 2.1-3**. The North Rasmussen phosphate deposit generally strikes north 44 degrees west and is normally bedded to the east with dips ranging from 33 degrees to 78 degrees.

Figure 2.1-2 Existing Operations

(page two**)**

Figure 2.1-3 Stratigraphic Column

A total of 247 exploratory holes have been drilled on North Rasmussen Ridge over several years. The average drill depth of these holes is 293 feet with a maximum depth of 640 feet. **Table 2.1-2** itemizes the North Rasmussen Ridge exploration drilling by year with the associated footage. The Exploration & Core Drilling Map (Appendix J of the North Rasmussen Ridge Supplemental Mine and Reclamation Plan; Agrium 2001) shows the location of drill holes and exploration drill roads.

TABLE 2.1-2
SUMMARY OF EXPLORATION DRILLING AT NORTH RASMUSSEN RIDGE

Year	Number of Holes	Footage Drilled	Average Depth	Maximum Depth
1987 & 1988	28	5,161	184	300
1996	13	4,428	341	440
1997	57	15,612	274	640
1998	-	-	-	-
1999	40	12,263	307	600
2000	109	34,815	319	578
Totals	247	72,279	293	640

Source: Agrium 2001

All of the data on exploration drilling for North Rasmussen Ridge has been entered into a database for analysis. Computer-generated geologic and block models were created from the database using Surpac mining software. By applying a specific phosphate ore cut-off to these models that represents Agrium's minimum requirement for acceptable quality ore, it was determined that sufficient wet tons of ore are recoverable within the North Rasmussen pits to support operations.

2.2 PROPOSED ACTION

The proposed North Rasmussen Ridge Supplemental Mine and Reclamation Plan is designed to recover phosphate (P_2O_5) ore along with almost 67 million loose cubic yards (lcy) of waste rock (**Table 2.2-1**). All of the waste rock generated from the proposed pits would be placed, as backfill, in the Central and North Rasmussen pits after the ultimate depths have been achieved. A Growth Media Storage Area would be developed and used to accommodate and temporarily store up to 918,284 lcy of material.

All available topsoil and suitable alluvium from the pit would be directly applied to completed and resloped areas when possible, or would be salvaged and placed in the Growth Media Storage Area for future use. Agrium anticipates salvaging approximately 1,015,716 cubic yards of growth media for use in reclamation. Based on Agrium's current annual production rate, the estimated life of the proposed North Rasmussen Ridge Mine would be approximately eight years. These facilities are shown in **Figure 2.2-1**.

TABLE 2.2-1
SUMMARY OF ANNUAL WASTE ROCK SEQUENCING (ALL QUANTITIES SHOWN IN LCY)

Mining Year	Total Waste Rock	Central Coyote Corner	Central Backfill Area F	North Backfill Area A	North Backfill Area B	North Backfill Area C	Total Waste Rock Storage
2004	8,063,400	3,489,969	4,573,431				8,063,400
2005	9,974,303		9,974,303				9,974,303
2006	8,395,342		7,860,694	534,647			8,395,342
2007	8,104,273		7,641,470	462,803			8,104,273
2008	8,486,582		472,094	8,014,488			8,486,582
2009	7,763,419			7,314,832	448,587		7,763,419
2010	10,595,750			3,348,534	5,431,923	1,815,293	10,595,750
2011	5,464,291			4,476,326		987,964	5,464,290
TOTAL	66,847,361	3,489,969	30,521,992	24,151,631	5,880,510	2,803,258	66,847,360
PERCENT TOTAL WASTE ROCK		5.2%	46%	36.1%	8.8%	4.2%	100.0%
TOTAL DESIGN CAPACITY		3,503,674	30,521,993	24,552,774	5,931,487	2,972,771	67,482,699

Notes: Total Design Capacity reflects the total volume available in each backfill area.
Annual waste rock volumes assigned to a specific backfill area may or may not completely utilize the total design capacity.
Backfill areas are shown on **Figures 2.1-2, 2.2-2, and 2.2-3.**
lcy = Loose cubic yards

Source: North Rasmussen Ridge Supplemental Mine and Reclamation Plan, Agrium 2001.

2.2.1 Mining Sequence

The North Rasmussen ore reserve would be developed using an open pit mining method on a series of 40-foot bench cuts, using a combination of in-pit retreating ramps and backfill ramps. The primary equipment for ore and waste rock mining would be a combination of trucks, track-mounted excavators, bulldozers, and front-end loaders. A track-hoe excavator would also be used to maximize recovery of ore in the bottom of the pit (pit crotch).

Initial development of North Rasmussen would begin at mine coordinate section 13200N, which would include any ore that remains under the northernmost Central Rasmussen end wall. Mining would proceed to the north along the strike of the ore body using in-pit retreating and backfill ramps to access the lower pit areas. The retreating ramps would tie in to the East Road Extension via seven different spur tie-in roads, as illustrated on the layout map in **Figure 2.2-1**. Two backfill ramps would tie in to the existing West Road on the west side of the Central Rasmussen pit and would be used to access the pit crotch from mine section 12600N to mine section 16300N. A third backfill ramp would tie in to the East Road Extension at mine section 16350N as the final access to the pit.

The configuration of the North Rasmussen pit is divided into two pit structures separated by about 70 feet of original ground. This small area, between mine sections 16300N and 16400N, lies in a fault zone and would not be mined for the following reasons:

- The strike of the ore body is offset 1,000 feet, which diminishes the quantity and quality of ore in this area, to the point it is not economically viable in the area.

- The 70 feet of original ground that separates the pits would provide a stable base to reestablish the No Name drainage after mining has been completed. Using this corridor to reestablish the drainage would eliminate problems related to reestablishing the drainage across backfill in the pit.

- The 70-foot corridor that separates the two pit structures would also provide access to the proposed Growth Media Storage Area throughout the mining and reclamation process. This corridor would also be used for a culvert to convey the No Name drainage across the pit, thus providing continuous drainage throughout the mining process.

The annual mine sequencing regime is illustrated on the Pit and Backfill Progression in **Figure 2.2-2.**

2.2.1.1 Panel A

The southern portion of the North Rasmussen pit (known as Panel A) would be mined from the Central Rasmussen pit end wall northward to mine section 16300N, where it would be concluded with an end wall at a 45-degree slope that faces south. Two in-pit retreating ramps would be used to access Panel A from the East Road Extension. The first of these ramps would tie in to the East Road Extension at mine section 12900N via a spur tie-in that would be created as part of the Central Rasmussen Modified Mine Plan. The second in-pit ramp would tie into the East Road

Figure 2.2-1 Proposed Action Facility Layout

Figure 2.2-2 Pit and Backfill Progression

Extension at mine section 16050N via another tie-in spur (**Figure 2.2-1**). Two backfill ramps would be used to access Panel A from the Central Rasmussen West Road. These backfill ramps would access material from the pit crotch north of mine section 13800N in Panel A.

2.2.1.2 Panel B

Mining of the northern portion of the pit (known as Panel B) would start with a north-facing end wall about 70 feet northeast of Panel A (**Figure 2.2-1**). Panel B would progress northward to mine section 19400N, exposing about 1,000 feet of pit crotch via an internal retreating ramp. This ramp ties in to the East Road Extension via a spur tie-in at mine section 18100N. The mining sequence would then stop in this area and move north to mine section 20500N, leaving 1,100 feet of original ground undisturbed in Panel B. This area would not be abandoned, but would be mined later in the sequence described below.

Mining would proceed from mine section 20500N to the north extent of Panel B at mine section 23935N using a spur road that ties in to the East Road Extension at mine section 21000N (**Figure 2.2-1**). This spur road would access an in-pit ramp that would allow the pit to progress down the steep terrain into Reese Canyon. The East Road Extension would progress northward into Reese Canyon and turn back at mine section 23890N before it connects to a backfill ramp near the north end of Panel B (**Figures 2.2-1 and 2.2-2**). This backfill ramp, along with the East Road Extension, would provide access to the lower portions of the pit in the Reese Canyon area.

After mining ends in the Reese Canyon area, mining would return to the central part of Panel B and mine northward through the 1,100 feet of original ground previously bypassed. Access would be obtained via a tie-in spur at mine section 19500N to an in-pit retreating ramp. The final crotch ore would be accessed via an in-pit backfill ramp, which ties in to the East Road Extension at mine section 16350N.

2.2.1.3 Placement of Backfill

The proposed mine sequencing would eliminate all external waste rock dumps by using the available space in the Central and North Rasmussen pits for backfilling. Waste rock would be contained in the areas of the pit where they originated. Water management would be enhanced by using only backfill areas for placement of overburden. In most cases, the pit slopes would be covered with backfill. During the mining process, backfill material would be used to construct backfill ramps to access middle to lower portions of the pit.

Backfill would be placed selectively so that center waste shale and any other potentially seleniferous material would be located in the middle and deep areas of the backfill. The non-seleniferous limestone and chert would then be used to cover the seleniferous materials. The backfill would be constructed by filling the pit from its crest in most areas. Backfill that extends above the crest of the pit would be constructed in 20- to 40-foot lifts, which would provide for some compaction in the upper areas of the backfill. Areas of the backfill below the crest of the pit that are designated for use as backfill access ramps would also experience some compaction. Backfill would be constructed using repose slope angles and resloped to 3.0h:1.0v after the area has been filled to capacity.

Annual waste rock production and destinations are described in **Table 2.2-1**. Waste rock destinations or backfill areas are illustrated on the Existing Operations, Pit and Backfill Progression, and Final Reclamation Plan in **Figures 2.1-2, 2.2-2, and 2.2-3**, respectively. The first backfill area to be used would be in the mined-out Central Rasmussen pit. A portion of the waste rock produced in the 2004 mining year would be placed in the Coyote Corner area of Central Rasmussen as backfill. The remaining waste rock from year 2004 and years 2005 through most of 2007 would be placed in Central Rasmussen backfill area F. As the Central Rasmussen backfill area F progresses, two backfill ramps would be constructed to provide access to the lower areas of Panel A. Backfilling would progress north from the Central Rasmussen backfill area F to the North Rasmussen backfill area A. The North Rasmussen backfill area A would hold waste rock mined during portions of years 2007 through 2011 (**Table 2.2-1**). Backfill area A includes all of Panel A, as previously described (**Figures 2.2-2 and 2.2-3**).

North Rasmussen backfill area B would be located at the northern end of Panel B and would effectively backfill the pit in Reese Canyon. It would contain waste rock mined during portions of years 2009 and 2010 (**Table 2.2-1**, **Figures 2.2-2 and 2.2-3**). North Rasmussen backfill area C would contain the remaining waste rock produced in years 2010 and 2011. A backfill ramp would be constructed within backfill area C that would be used to mine the last ore from Panel B.

After mining ends in Panel B, it is proposed to rehandle enough backfill to cover the ore and waste shale exposed in backfill area C. Backfill area C would contain 2.8 million lcy of waste rock of which 1.6 million cu yd would be rehandled to that location. This waste rock would be selectively mined and backfilled with non-seleniferous limestone. By selectively using non-seleniferous limestone, an impervious cap would not be necessary. The rehandled material would be placed in the pit bottom to cover the exposures of ore and center waste shale with a minimum of 8 to 10 feet of cover (**Figures 2.2-2 and 2.2-3**). The rehandled material would be graded and sloped so that water would flow away from the hanging wall towards the limestone footwall and down a 1.5 percent grade at the contact between the limestone footwall and backfill. The design would provide ample distance and area for water to drain into either the backfill or the limestone footwall.

This structure would reduce exposure of water, wildlife, and vegetation to the potentially seleniferous ore and waste shale zones. The rehandled materials would be reshaped, covered with 2 to 3 feet of growth media, and re-vegetated as dictated by the BMPs for backfill reclamation (see Section 2.2.3.4).

Figure 2.2-3 Final Reclamation Plan

(page two)

2.2.2 Mine Planning

2.2.2.1 Design of Pit

Agrium has developed new design parameters for hanging walls that require construction of catch benches and a steeper bench face angle. This new design was developed using experience, slope analysis, and the results of a recent study of slope stability (Call and Nicholas 2000). To aid in this analysis, six core holes were drilled along the entire North Rasmussen strike length to obtain rock quality data. The final recommendations for the footwall slope and footwall bench design parameters for the North Rasmussen pits are nearly identical to those currently in use for the Central Rasmussen pit. The basic North Rasmussen bench design is 80 feet high, and 20 feet wide for the hanging wall and 40 feet wide for the footwall. All benches would be tapered to the inside of the pit to promote drainage of water. However, some alluvial slopes are designed at 1.5h:1.0v or 33.7 degrees as deemed necessary, and overall angle of the pit slope is 0.95h:1.0v or 46.5 degrees.

The design of the North Rasmussen pit, both Panel A and Panel B combined, would be 10,735 feet in length, starting on the southern end at mine section 13200N and ending on the northern end at mine section 23935N. These pits are separated by 70 feet of original ground. **Table 2.2-1** summarizes the waste rock quantities in the North Rasmussen Ridge Mine pits. The elevation of the pit floor in Panel A is constant at 6,760 feet above mean sea level (amsl). The Panel B floor elevation is not constant, but varies in elevation as follows:

- From mine section 16600N to 21000N, the floor elevation in Panel B is 6,840 feet amsl.
- From mine section 21000N, to 21400N the Panel B floor decreases 100 feet in elevation from 6,840 to 6,740 feet amsl. This produces a 25 percent floor slope over a distance of 400 feet.
- From mine section 21400N to 23830N, the Panel B floor remains constant at 6,740 feet amsl.

A south-facing end wall finishes the Panel B pit (**Figures 2.2-1 and 2.2-2**). The pit depths designed for any area were calculated by the use of a pit optimization algorithm, strip ratio calculations, and by the quality of the modeled ore. Panels A and B would disturb 196.9 acres on lease and 1.8 acres off lease, which would require a lease modification in two areas on the national forest and a Temporary Use Permit issued by the IDL (**Table 2.2.2**). Areas of pit disturbance outside of the lease are approximately at mine sections 13930N and 15700N. Portions of both of these areas would be disturbed by development of the pit. An application for these lease modifications was submitted to the BLM on February 9, 2001. The East Haul Road Extension also crosses the lease boundary at mine section 22600N (0.2 acres) as described in section 2.2.2.3, which would require a Temporary Use Permit from the State of Idaho.

2.2.2.2 Design of Waste Rock Backfill

Waste rock produced from the mining process would be placed in the unbackfilled portions of the Central Rasmussen pit and the mined-out areas of the North Rasmussen pits as they become available. Under this proposed design, no external waste rock dumps would be required for mining the North Rasmussen pits. Although no external waste rock dumps are required, a Growth Media

Storage Area or stockpile would be developed to store available topsoil and alluvium that cannot be immediately used for reclamation during the mining sequence. Material from the Growth Media Storage Area would be used for reclamation as areas become available. **Table 2.2-2** summarizes the areas of disturbance and reclamation for backfill and the Growth Media Storage Area.

Disposal areas for backfill are designed to incorporate convex faces at 3.0h:1.0v slopes and a one percent out-sloped top to prevent erosion and enhance revegetation. Additionally in panel A, surface ditches would intercept the runoff from a modified 2 percent top surface slope to minimize the infiltration into the overburden. The ditches would divert surface flow to access roads used by trucks during the backfill placement. The roads would be reduced in width to 20-feet, and covered with compacted alluvium to further minimize infiltration into the overburden. The ditches and roads would have velocity-reducing structures (rocks, logs) to slow the water and reduce erosion. Runoff would be channeled down the roads to energy dissipater/silt retention ponds between the pit crests and the east haul road. On panel B backfill, Agrium would construct two 50-foot wide corridors (located at mine sectors N22550 and N23500) to transport run-on water across the backfill. These corridors would also be constructed of alluvium compacted into a 3-foot thick layer. The corridors would be sloped across the backfill from west to east and velocity-reducing/silt retention structures would be placed in them. On the east side of the pit crest, the water would re-enter the original drainage prior to converging with the Reese Canyon Creek. These corridors would intercept water from approximately 111 acres up-gradient of the backfilled pit. These designs are estimated to reduce water infiltration into the overburden by 85 percent.

All slopes would be shaped to blend with the natural surrounding topography. Water management BMPs listed in Section 2.2.3.2 would be used to control erosion and sedimentation on the reclaimed backfill slopes. All backfill areas would be reclaimed to USFS and IDL specifications. Material from the Growth Media Storage Area, along with direct placement of topsoil and alluvium, would be used to cover the backfill slopes and other reshaped areas as part of the reclamation process. Covering of the backfill areas with growth media would be followed by the application of a fertilizer and seed mix approved by USFS and IDL.

2.2.2.3 Ore and Waste Rock Transportation

Ore produced from the North Rasmussen pits would be hauled by truck to the Wooley Valley rail loading facility (tipple). The haul routes would include using the East Road Extension, as described below, the existing West Road, and the existing haul road from the mine to the tipple. One new haul road would be constructed within the boundary of the lease to accommodate haulage needs for the North Rasmussen pits. This haul road would be built by extending the approved East Road from Central Rasmussen northward paralleling the proposed North Rasmussen pits. This extension of the East Road would involve areas of cut and fill as it progresses north along the proposed pit and into Reese Canyon. Cut and fill slope ratios would be variable along the road’s length. Berms along the road would be as high as the highest axle on the haul trucks. Cut and fill slopes would be seeded after the road was constructed. The East Road Extension would provide

TABLE 2.2-2
ACREAGE DISTURBANCE AND RECLAMATION SUMMARY

Description	Disturbed	Reclaimed
United States Forest Service Surface Disturbance		
Pit Disturbance	120.40	85.20
Haul Roads Disturbance	27.23	27.23
Staging and Well Areas	1.18	1.18
Water Management Disturbance	1.23	1.23
Wetland Disturbance	0.00	0.00
Growth Media Storage Disturbance	20.78	20.78
Total	**170.82**	**135.62**
Idaho Department of Lands Surface Disturbance		
Pit Disturbance	78.30	41.30
Haul Roads Disturbance	19.60	19.60
Water Management Disturbance	0.50	0.50
Wetland Disturbance	0.00	0.00
Growth Media Storage Disturbance	0.00	0.00
Total	98.40	61.40
Total Disturbance		
Pit Disturbance	198.70	126.50
Haul Roads Disturbance	46.83	46.83
Staging and Well Areas	1.18	1.18
Water Management Disturbance	1.73	1.73
Wetland Disturbance	0.00	0.00
Growth Media Storage Disturbance	20.78	20.78
Total	**269.22**	**197.02**

Note: Pit and road disturbance includes areas outside lease boundaries.
Source: North Rasmussen Ridge Supplemental Mine and Reclamation Plan, Agrium 2001.

access to the pit as well as ore and waste rock haulage routes for the entire strike length of the North Rasmussen pits. Nearly the entire haul road would be constructed within the boundaries of the lease and the terrain would be less severe than on the west side of the pit. Part of the East Road Extension lies outside the boundary of the lease at section 22600N. The area of disturbance of the East Road Extension outside of the boundary of the lease is 0.2 acres and would be permitted under the IDL with a Temporary Use Permit. Seven access spur roads would be developed from the East

Road Extension to the in-pit access ramps. These spur roads would be constructed with both cut and fill areas, depending on each specific spur and its position on the original topography. New roads would be constructed with road cut materials, chert, limestone, or a combination.

Using in-pit retreating and backfill ramps that tie into the East Road Extension and the Central Rasmussen West Road would provide access to the pit in a reasonable manner. In-pit retreating ramps would be removed as mining progresses, which can be difficult and costly. However, the adverse effects of in-pit ramps are less than an all-cut ramp with respect to the North Rasmussen Mine Plan. The existing Central Rasmussen West Road would be used as an in-pit backfill ramp for access. A single-lane haul road would also be constructed across the unmined land bridge between the northern (Panel B) and southern (Panel A) pits to access the proposed Growth Media Storage Area located on the west side of the pit. Special care would be given to the cut and fill slopes on all roads so that disturbance by water and sediment to nearby drainages is minimized or eliminated. BMPs listed in Section 2.2.3 that apply would be used, and may include erosion matting, silt fencing, and straw bales/wattles.

When these roads and accesses are no longer needed, they would be reclaimed to USFS and IDL specifications. Reclamation would be accomplished by pulling material up, or hauling material into, the cut portions of the road and shaping the materials to blend with the surrounding topography. The fill portions of roads would be shaped at 3.0h:1.0v slopes to blend with surrounding land forms. Topsoil or other growth media would be placed on all shaped areas whenever possible, followed by fertilization and seeding.

2.2.2.4 North Rasmussen Staging and Well Areas

A small staging area would be constructed on the east side of the East Road Extension at or near mine section 17000N. The dimensions of this area would be 150 feet wide by 300 feet long. This area would be used for activities such as in-field mechanical repairs, storing wear components, and short-term equipment parking. No fuel or lubricant tanks would be installed, as equipment and vehicles would be fueled and lubricated from a service truck that would travel to the parked equipment. A containment pond would be designed and built to contain any possible contaminants associated with run-off water from this staging area (**Figures 2.2-1 and 2.2-4**).

A second area would be constructed on the east side of the East Road Extension at or near mine section 15900N. This area would contain a water well for dust suppression and generator to supply power to the well pumping system. The generator and its fuel tank would be set in a concrete containment structure to contain any possible spills or leaks. The containment would be designed to contain twice the capacity of the fuel tank. The pump would transport well water under the East Road Extension to a surge tank. The surge tank would be located between the East Road Extension and the pit crest in Panel A at or near mine section 15750N. This location would provide the surge tank with the elevation needed so that water in the tank can feed by gravity into a water truck below on the East Road Extension. A small turnout would be constructed on the west side of the East Road Extension directly below the surge tank to provide space for a filling station for water trucks (**Figure 2.2-1**).

Figure 2.2-4 Water Management Plan for Ultimate Pit

(page two)

2.2.3 Environmental Monitoring, BMPs and Reclamation

The following sections summarize the environmental monitoring, BMPs and reclamation plans that Agrium has developed as part of the Proposed Action.

2.2.3.1 Cultural Resources Inventory

All of the proposed areas of disturbance in the North Rasmussen Ridge Supplemental Mine and Reclamation Plan have been inventoried to current standards for cultural resources. For the baseline cultural resources data collection, Maxim (2000) resurveyed any areas that had been surveyed prior to 1990. Areas that were resurveyed by later studies included portions of the NE/NE Section 16 (Druss 1983) and portions of Sections 15 and 22 where sample transects had been surveyed by Basin and Range Research that same year. Other portions of the North Rasmussen Ridge Mine area in Sections 9, 10, 15 and 22 were surveyed (Polk 1991; Polk 1993).

The portion of Agrium state lease (9313) that required new inventory, and portions of lease areas I-07619 and I-04375 that had not been covered were surveyed by Maxim (2000). No historical properties were identified by the cultural resource inventories, and cultural resource clearance was recommended. Because no historical properties were identified within the North Rasmussen Ridge Mine area, no avoidance, monitoring, or mitigation measures would be needed for cultural resources. If unanticipated human remains or cultural materials are encountered during mining, operations would be halted in the vicinity of the discovery and the Forest Service archaeologist would be notified. If vertebrate fossils are uncovered during mining, operations would also be halted and the archaeologist would be notified.

2.2.3.2 Water Management

Three drainages could be affected by development of the North Rasmussen Ridge Mine. Two of these drainages, No Name Creek and Reese Canyon Creek, would be minimally disturbed by the North Rasmussen pit and haul road. No Name Creek is considered to be ephemeral while Reese Canyon Creek is considered to be intermittent. The third drainage, the West Fork of Sheep Creek, is perennial in its lower half and would be paralleled by the East Road Extension. Numerous BMPs would be used for water management at North Rasmussen Ridge, as discussed below. The number, size, and location of these BMPs may be adjusted as mining progresses and the run-off characteristics of the area are better defined. New BMPs would be implemented as they are developed and proven to be viable **(Figure 2.2-4** and **Table 2.2-3)**.

Water Run-Off/Run-On Management

North Rasmussen Pit Area. Run-off water from the undisturbed ground on the east side of the pit is expected to be minimal as a result of the close proximity of the haul road to the ultimate pit crest. The run-off water that is produced would either be trapped in natural depressions between the haul road fill and original ground, or be contained in retention ponds that would be constructed as shown on the Water Management Plan (**Figure 2.2-4**). The sediment ponds are designed to accommodate the 100-year, 24-hour storm event.

TABLE 2.2-3
WATER MANAGEMENT CALCULATIONS

Pond	Size	Adjusted Capacity Cubic Feet	Drainage Acres			Potential Inflow (Acre Feet)			Potential Inflow (Gallons)			Potential Inflow (Cubic Feet)			Excess Capacity	
			Road Surface	Original Ground	Total	Road Surface	Original Ground	Total	Road Surface	Original Ground	Total	Road Surface	Original Ground	Total	Gallons	%
A	150’x50’x10’	56,250	2.300	2.500	4.800	0.690	0.750	1.440	224,837	85,536	310,372	30,058	11,435	41,494	14,756	36
B	150’x50’x10’	56,250	2.300	2.750	5.050	0.690	0.825	1.515	224,837	94,089	318,926	30,058	12,579	42,637	13,613	32
C	150’x50’x10’	56,250	1.800	3.440	5.240	0.540	1.032	1.572	175,959	117,697	293,656	23,524	15,735	39,259	16,991	43
D	150’x50’x10’	56,250	2.980	0.910	3.890	0.894	0.273	1.167	291,310	31,135	322,445	38,945	4,162	43,108	13,142	30
E	175’x50’x10’	65,625	3.440	1.210	4.650	1.032	0.363	1.395	336,277	41,399	377,676	44,957	5,535	50,492	15,133	30
F	150’x50’x10’	56,250	2.060	0.920	2.980	0.618	0.276	0.894	201,375	31,477	232,852	26,922	4,208	31,130	25,120	81
G	100’x50’x10’	37,500	0.918	2.750	3.668	0.275	0.825	1,100	89,739	94,089	183,828	11,997	12,579	24,576	12,924	53
H	150’x50’x10’	56,250	2.200	0.820	3.020	0.660	0.246	0.906	215,061	28,056	243,117	28,751	3,751	32,502	23,748	73
I	150’x50’x10’	56,250	2.02	1.51	3.53	0.606	0.453	1.059	197,465	51,664	249,129	26,399	6,907	33,306	22,944	69
J	150’x50’x10’	56,250	2.04	1.72	3.76	0.612	0.516	1.128	199.420	58,849	199,421	26,660	7,867	34,528	21,722	63

Equations Used

Adjusted Capacity (Cubic Feet)	(L’ x W’ x D’) *0.75(% of usable pond capacity
Potential Inflow (Acre Feet)	(Acres * 3.6(max run-off))/12
Potential Inflow (Gallons)	((Acre Feet * 325,850(gallons/acre foot)) * (100% infiltration)
Potential Inflow (Cubic Feet)	((Gallons/7.48(gallons/cubic foot))
Excess Capacity (Gallons)	Adj. Capacity (Cubic Feet) – Potential Inflow (Cubic Feet)
Excess Capacity (%)	Excess Capacity (Gallons)/Potential Inflow (Cubic Feet)

Source: North Rasmussen Ridge Supplemental Mine and Reclamation Plan, Agrium 2001.

General Information

Maximum inches of run-off	3.6
Infiltration rate on haulroad	0%
Infiltration rate on original ground	65%
Actual % of useable pond capacity	75%
(ponds would not have vertical walls)	
Gallons per acre foot	325,850
Gallons per Cubic Foot	7.48

Generally, run-off water from undisturbed ground on the west side of the pit should pose no problems. Either the water would flow toward the west, which drains away from the pit, or the amount flowing east toward the pit would be so small that pit dewatering or concerns for wall stability would not be anticipated.

An 85 percent reduction in water infiltration would be achieved in backfill areas A and B. The top of backfill area A would be sloped toward the east at a 2 percent grade (**Figure 2.2-5**). This would allow water from snowmelt and summer storms to flow into two water interceptor trenches. These trenches would be constructed at the break in slope between the top of the backfill and the 3.0h:1.0v side slopes of the backfilled pit. The water would drain to the south in these trenches at a 2 percent grade. The trenches would intercept the backfill access roads that were used to haul overburden to the dump top. These access roads would be reduced in size to about 20-feet wide and would extend down the side slope to the original ground. The interceptor trenches would be constructed with compacted alluvium in the base to reduce infiltration and a small berm would also be constructed on the west side to contain the water in the trenches. The drainage ramps would have compacted clay in the base and would have rip-rap placed on the ramp to reduce the water velocity and erosion. The ramps would extend out into the original ground and into energy dissipaters.

The run-on water onto backfill area B originates from undisturbed areas to the east of the pit (**Figure 2.2-6**). There are two drainages that would be intercepted by Panel B. In both cases, the water would be handled the same. The run-on water would be carried across the backfill pit to undisturbed ground on the west side via a constructed drainage. The drainages would be made of compacted alluvium in the base to reduce water infiltration down into the backfill. The slope of the drainage would be at a 2 percent grade to the west. To reduce erosion in the drainage, logs and rip-rap would be used to slow the velocity of any runoff.

Agrium has obtained a Multi-Sector General Permit for storm water discharges from the U.S. Environmental Protection Agency (EPA). Currently, all of South and Central Rasmussen fall under the provision of this permit. North Rasmussen would also fall under the provisions of this permit. In general, the requirements are as follows:

- Visual inspections of all storm water retention structures at least quarterly with documentation of results.
- Annual year-end inspection of all storm water structures with results, recommendations for improvement, and an action plan for the improvements.
- Frequent (three per week) inspections during spring run-off and after summer thunderstorms with documentation of findings.
- Regular compliance inspection of all fueling areas or any area where hazardous substances could be spilled.
- Removal of retention structures during site closure.

The inspections would evaluate the pollution prevention structures and procedures and develop improvements as needed or as processes change.

Growth Media Storage Area. The proposed Growth Media Storage Area would be constructed

Figure 2.2-5 Cross-Section A-A' Surface Water Management Structures

Figure 2.2-6 Cross-Section B-B' Surface Water Management Structures

with 3.0h:1.0v slopes and seeded to prevent slope toe failure and to reduce run-off rilling. The storage area would be surrounded by a barrier of trees and shrubs removed from the footprint of the stockpile to act as a barrier to sediment. The storage area has been designed with a 100-foot buffer zone between the toe of the stockpile and the ephemeral drainage of upper No Name Creek. After the Growth Media Storage Area is removed, the trees would provide natural debris to be returned to the footprint to slow run-off until vegetation can be reestablished. A water retention pond would be constructed at the base of the access road to the Growth Media Storage Area. This pond would collect any water run-off from the road.

No Name Creek and Reese Canyon Creek. Agrium plans two stream diversions in the North Rasmussen Mine area. The first is in the ephemeral No Name Creek drainage (**Figure 2.2-4**). The water at this point in the drainage originates from snowmelt in the spring. The southern end of Panel B would intercept this drainage during mining, resulting in water that enters the pit and mining area. To prevent water from entering and to continue the flow of water down the No Name drainage, Agrium proposes to place a 24-inch culvert in the drainage west of the Panel B pit. The culvert would divert the water around the proposed pit, adjacent to the growth media access road, under the haul road, and back into the original drainage east of the haul road (**Figure 2.2-4**). A standpipe at the entrance of the culvert to prevent plugging, and an energy dissipater at the outflow of the culvert would be used to maintain flow and reduce erosion. By diverting the water though a culvert before it reaches any mining disturbance and discharging the water past any disturbance, this plan would keep the water free of associated mining sediments. The total length of the culvert would be 700 feet. Once mining is completed in this panel and the access road to the Growth Media Storage Area and the haul road are no longer needed, the culvert would be removed. A third-party contractor would design a new drainage channel around the backfilled Panel B pit, through the haul road, and into the original drainage. Stream meanders and proper vegetation would be incorporated, along with materials needed to stabilize the stream bank such as matting.

The placement of the culvert and the reestablishment of the drainage would take place during summer, when the area is dry. Currently, the Forest Service Sheep Creek Road crosses this drainage at the point where Agrium proposes to place the 24-inch culvert. The Forest Service culvert is 18 inches in diameter. The stream flow 4,000 feet downgradient of Agrium's proposed culvert site in No Name Creek on June 14, 2000, was 0.10 cubic feet per second (cfs); on September 12, 2001, the flow was too small to be measured (Maxim 2001a). The 24-inch culvert was designed to pass the 100-year, 24-hour storm.

The second stream diversion is the intermittent drainage in Reese Canyon Creek at mine section 22500N on the east side of the pit (**Figure 2.2-4**). The water in this drainage originates from snowmelt and from a small wetlands seep to the south. Agrium proposes to place a 24-inch culvert in the drainage, divert the water past the point where it could seep into the pit, and then return it into the original channel. The total length of the culvert would be 100 feet and would also pass the 100-year, 24-hour storm. Once mining is completed in this panel, the culvert would be removed. A third-party contractor would be retained to design a new stream channel at the location of the culvert. This plan would keep the water away from the pit and prevent any water loss into the pit. The stream flow 1,200 feet downgradient of Agrium's proposed haul road crossing of Reese Canyon Creek was 0.15 cfs on June 14, 2000; on September 12, 2000, the flow was too small to be measured (Maxim 2001a).

All culvert work in both No Name Creek and Reese Canyon Creek would occur at the time of the year when there is no water in the drainage. There would be no direct disturbance to wetlands in either No Name Creek or Reese Canyon Creek. The topsoil in and adjacent to the channels at the stream crossings would be salvaged and stored for use during reconstruction of the drainages.

Backfill Slopes. Backfill slopes would be shaped to a final 3.0h:1.0v slope. Non-seleniferous chert and limestone placed over any shale wastes during backfill construction would be covered with an average of 2 to 3 feet of growth media. The final reclaimed slope would be blended smoothly onto the original undisturbed ground, thus eliminating any ponding of run-off water between the reclaimed slope and the pit crests. There are no external overburden dumps in the North Rasmussen Ridge Mine Plan. All overburden would be stored as backfill in the pits.

Staging Area and Water Well/Dust Suppression Tank. A small run-off collection pond would be constructed at the southeast corner of the staging area. The staging area would be sloped toward this pond to collect possible run-off water contaminated with hydrocarbons. The haul road would be sloped to the west and away from the staging area to keep any run-off water from the adjacent haul road from filling this pond. An underflow drainpipe would pass from the staging area collection pond to a water containment pond constructed in original ground east of the staging area. A gate valve would be attached to the underflow drainpipe to drain water from underneath any hydrocarbons floating on the water surface. Water stored in the containment pond would be evaporated. Periodically, the collection pond would be cleaned out with a backhoe and any accumulated hydrocarbons in soil would be bacteriologically digested or disposed of according to federal requirements. **Figures 2.2-4**, **2.2-7**, and **2.2-8** illustrate these facilities.

A well would be drilled to supply water for dust suppression near section 15900N. A diesel-powered generator would be located next to the well to power the well pump. The diesel fuel tank and generator would be held inside a concrete containment structure to separate any surface run-off from any leaks or spills from the generator or fuel tank. The surface water would be directed to haul road retention pond D for storage. This retention pond is on the west side of the haul road, so a fuel spill outside the containment structure would be unlikely to travel toward the No Name Creek drainage (**Figure 2.2-4**).

The water storage tank and associated filling area for water trucks would be located on the west side of the haul road so that any fuel leaks would be held in haul road retention pond D and would not be able to reach No Name Creek (**Figures 2.2-4**). Periodically, the retention pond would be cleaned out with a backhoe and any accumulated hydrocarbons and soil would be bacteriologically digested or disposed of according to federal requirements.

In-Pit Water

Water that accumulates in the North Rasmussen pit from snowmelt, rain, or groundwater seepage and could interfere with mining or could create a workplace hazard to employees in the pit would be pumped into a water truck and hauled to a mined-out pit. If any of the water in the pit is needed for dust control, samples of the water would be tested for selenium before it is used. No water in the pit would be dumped into any drainage.

Snow Removal and Storage

Snow that accumulates in the pits, ramps or roads that could reach drainages or other sensitive areas would either be picked up by the mine operator and dumped into a mined-out backfill pit or removed and placed on undisturbed ground. Removal of snow would decrease the volume of water in active mining areas and consequently reduce the sediment load possibly leaving the site.

2.2.3.3 Selenium Issues and Planned BMPs

With the on-going selenium investigations and testing efforts, all the BMPs needed have not yet been identified. As new proven BMPs become available, Agrium would put them in place where practical. The BMPs to be used at this time for reduction and control of selenium are described in the following sections.

Mine Planning

One of the most significant BMPs to reduce movement of selenium through the environment is the elimination of external overburden dumps. Any movement of selenium is held within the original pit profile and is not allowed to reach any surface waters.

Selective overburden handling is important for correct placement of seleniferous waste rock. Haul road construction materials, energy dissipaters, and any other materials placed near water would be non-seleniferous. Placement of center waste shales that are high in selenium within the mined-out pit would be toward the middle and the lower parts of the pits. Mine sequencing is designed to accomplish this objective.

Water Management

Isolating and controlling the movement of water with culverts and retention ponds can reduce possible selenium uptake in vegetation. Any discharge water would be monitored to control and document concentrations of selenium until reclamation is complete.

Stream alterations of No Name Creek and Reese Canyon Creek would prevent water from coming in contact with any mine disturbances that could transport selenium downstream.

Water drainage on haul roads would be controlled with sloping and crowning to direct run-off into planned retention ponds.

Soil stabilization depends on water movement over and down slopes. Erosion matting would be used on fill slopes for haul roads where possible movement of soil into drainages would be controlled. Silt fencing and straw bales/wattles would also be used extensively to control movement of water and soil from mining disturbances.

Figure 2.2-7 Haul Road Drainage – Pond System

Figure 2.2-8 Staging Area Drainage – Pond System

Brush barriers would be used where possible to control the movement of soil from slopes during run-off. Final reclamation would incorporate the brush barrier back onto the slopes to reduce erosion and to provide a source of nutrients and some wildlife habitat.

Seeding and Vegetation

Management of growth media is critical to success of the revegetation. All soil deemed suitable for a growing media would be salvaged and stockpiled or placed directly on areas ready for reclamation. Suitability would depend on physical and chemical characteristics, some of which are yet to be determined. Brush and small trees that were not removed for a brush barrier would be included with the growth media to be spread on the final reclaimed slopes.

The final reclaimed slope angle would be no greater than 3.0h:1.0v. The growth media would be spread over the final backfill slope to an average depth of 2 to 3 feet with minimum compaction.

Seeding would be completed as soon as possible to reduce rilling and soil movement. Selection of plant species would concentrate on shallow-rooting species of mostly native plants (**Table 2.2-4**). Species selection can vary depending on future research and studies. Currently, testing of selected native woody species is under way. The survivability and possible contaminate uptake by these species would be evaluated for their possible future use on the North Rasmussen Ridge Mine area.

Sampling and Monitoring

Monitoring is a critical component of reclamation. Determining plant success, cover, and productivity is an important part of the monitoring process. The measurement of selenium in forage is required for any decisions on range management and the ultimate release of the mined lands back to multiple use.

Current or historical monitoring at Rasmussen Ridge includes:

- Surface and groundwater monitoring.
- Storm water discharge monitoring.
- Collection and analysis of samples of growth media.
- Historical analysis of vegetation on waste rock dumps.
- Experimentation with seed and container stock of various native tree and shrub species.

TABLE 2.2-4
PROPOSED RECLAMATION SEED MIX AND FERTILIZING RATE[1]

Seed Description	% of Mixture	lbs/Acre
Mountain Brome (*Bromus marginatus*)	20	10
Orchard Grass (*Dactylis glomerata*)	14	7
Bluebunch Wheatgrass (*Agropyron spicatum*)	12	6
Sheep Fescue (*Festuca ovina*)	12	6
Slender Wheatgrass (*Agropyron trachycaulum*)	12	6
Great Basin Wildrye *(Elymus cinereus)*	10	5
Idaho Fescue (*Festuca idahoensis*)	10	5
Western Wheatgrass (*Agropyron smithii*)	10	5
Totals	100	50

[1]Seeding would be done with a rangeland drill at a rate of 50 lbs/acre. Fertilizer application rates would be established after soil testing has been completed.
Source: North Rasmussen Ridge Supplemental Mine and Reclamation Plan, Agrium 2001.

2.2.3.4 Reclamation

The North Rasmussen Ridge Supplemental Mine and Reclamation Plan is designed to maximize pit backfilling and minimize the long-term impacts to the environment. The complex mining sequence described in section 2.2.1 was developed for several reasons, including the case that backfill would provide a base for reclamation of more of the disturbed area, eliminate exposure of the pit wall, and eliminate development of a post mining pit lake in the Reese Canyon area from groundwater infiltration and surface water run-off (**Figures 2.2-2 and 2.2-3**). Under this proposed plan, all disturbed areas that are amenable to reclamation would be reclaimed. Vegetation would be established during the first growing season after final surface preparation to reduce the exposure time to potential erosion and effects to the surrounding environment (**Figure 2.2-4**).

All suitable topsoil and alluvium would be salvaged from all mining and road-building areas for use in reclamation (about 1,015,716 cu yd). Direct placement of this material to resloped areas is the preferred option; however, a Growth Media Storage Area would be used to temporarily hold up to an estimated 918,000 lcy of material. The growth media is composed of topsoil and alluvium. The actual volume of suitable topsoil and alluvium was calculated from the Order II baseline soil survey as defined by draft USFS selenium criteria for useable reclamation soils. This material would be used to cover resloped backfill and roads where possible.

Pit Backfill Areas

All backfill faces would be shaped to blend into the surrounding land forms with a 3.0h:1.0v slope. The top surfaces would all be graded at a 2 percent slope away from the faces to enhance revegetation and reduce erosion. Trees and shrubs piled at the boundaries of the pit at the start of mining would be pushed back onto the reclaimed and contoured backfill slopes for use as erosion control and wildlife habitat. Vegetation would be established using a rangeland seed drill pulled by a D-4 dozer. All disturbed areas that have been resloped and covered with growth media would be seeded. The proposed seed mix and fertilizer rates are shown in **Table 2.2-4**. The fertilizer application rate would be adjusted depending on the quality of the growth media. Shown in **Table 2.2-5** is a list of possible native tree and shrub species that could be planted on the backfill areas. The seeds for the tree and shrubs would be collected on site before mining begins and started in a nursery before they are planted on the reclaimed backfill areas. As additional testing and research is completed and proven to be beneficial as selenium BMPs for the seed mix and other plantings, Agrium would adjust the seed and brush species accordingly.

TABLE 2.2-5
CONTAINER PLANTINGS OF NATIVE SHRUB AND TREES FOR PIT BACKFILL AREAS

Possible Tree and Brush Species[1]
Mountain Snowberry (*Symphoricarpos oreophilus*)
Mountain Big Sagebrush (*Artemisia tridentata* var. *vaseyana*)
Woods Rose (*Rosa woodsii*)
Serviceberry (*Amelanchier alnifolia*)
Deerbrush (*Ceanothus velutinus*)
Lodgepole Pine (*Pinus contorta latifolia*)

Note: [1]Aspect and slope would determine the location and amounts of container plantings. Bucket planting of aspen and other native species would be used where possible.
Source: North Rasmussen Ridge Supplemental Mine and Reclamation Plan, Agrium 2001.

Haul Roads

Agrium would reclaim haul roads as they are no longer needed for access. The road prisms would be eliminated to blend into the pre-mining topography, either by removing the fill material or in some cases by spreading and shaping the fill into a natural configuration. Road cuts would be filled in so that no steep cut faces remain. Any road culverts would be removed to reestablish original drainages. Before road construction begins, all suitable topsoil and alluvium would be removed and saved. Before areas are seeded and fertilized, an average of 2 to 3 feet of growth media would be placed over the sloped and shaped haul roads. In sensitive areas or any area of concern, silt fencing or straw bales would be placed at the toe of the reclaimed road fill to protect surface waters until vegetation is deemed adequate to eliminate any erosion problem. Matting would also be placed on the slopes to stabilize soils and reduce erosion.

Staging and Water Well Area

The soils at the planned staging area and the water well for dust suppression would be tested for hydrocarbon contamination before the sites are reclaimed. If contamination is detected, proper disposal or remediation of the soils would be undertaken. Disposal would involve hauling to an approved disposal site. Remediation would be accomplished by means of bacterial digestion. If testing reveals no or acceptable levels of contamination after remediation, then the areas would be sloped to blend into the pre-mining topography. The concrete containment structure for the generator would be broken up, removed, and buried at a suitable depth in an appropriate location.

Water Management Retention Ponds

After mining is completed and haul roads are reclaimed, the retention ponds adjacent to the haul road would also be reclaimed. Any overflow pipes or culverts would be removed and the ponds would be filled in with suitable material. The fill material would be shaped to blend in with the topography. Growth media would be spread over the disturbance to an average depth of 2 to 3 feet. The areas would be fertilized and seeded with a USFS-approved seed mix (**Table 2.2-4**).

Growth Media Storage Area

After all the growth media has been removed from the Growth Media Storage Area, the trees and shrubs that had been used as a barrier to silt and run-off at the toe of the stockpile would be spread over the disturbance footprint. This debris would provide some wildlife habitat and soil nutrients. Agrium anticipates salvaging 1,015,716 cu yd of growth media for storage to meet reclamation needs. The area would be fertilized and seeded with native grasses along with container tree and shrub plantings from a nursery at a similar elevation (**Tables 2.2-4 and 2.2-5**).

No Name Creek and Reese Canyon Creek

The preferred design of the pit intercepts small areas of the No Name Creek and Reese Canyon Creek (**Figure 2.2-1**). During mining in these areas, any water would be diverted through a pipe or culvert that would extend over a corridor of unmined ground and back into the original drainage downstream. After mining is completed, an experienced third-party contractor would design a new section of natural-appearing stream channel to take the place of the pipe or culvert. The design would include meanders, pools, and vegetation. The stream flow would be reestablished in the original channel location, so that the stream channel water would not be affected by flowing over unconsolidated backfill material.

Rehandle Area In Pit Bottom

Agrium would rehandle 1,164,112 lcy of non-seleniferous clean limestone overburden material to cover the exposed ore and waste shale left in backfill area C of mining Panel B. The overburden would be placed and sloped at 3.0h:1.0v or less to drain any run-off away from the hanging wall and toward the limestone footwall. At the toe of the rehandle, water would flow south along the limestone contact at a 1.5 percent grade, thus eliminating the possibility that a post-mining pit lake would develop. This rehandled overburden would be covered with an average of 2 to 3 feet of growth media, fertilized, and seeded with an approved USFS seed mix (**Table 2.2-4**).

2.2.3.5 Air Quality

Agrium recognizes that mining produces minimal quantities of particulate emissions (dust) and gases from internal combustion engines. Potential sources of dust include mining of ore and waste rock, drilling and blasting, and material haulage. Mining ore and waste rock would produce a minimal amount of dust based on the relatively high moisture content of the material. Dust produced from the blast hole drill would be minimized by dust control devices installed on the drill. Dust produced from material haulage would be kept to a minimum by using water trucks to apply water as a dust suppressant to the roads. Dust suppressing chemicals such as magnesium chloride and calcium chloride would also be used on some road areas as needed.

2.2.3.6 Hazardous Materials and Wastes

The proposed project would comply with the applicable federal hazardous materials regulations, including the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or "Superfund") the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Clean Air, Clean Water, and Clean Drinking Water Acts, and other applicable federal and state laws and regulations.

Surface mining operations are subject to the Federal Mine Safety and Health Act of 1997 (MSHA). Training for site personnel in hazard recognition and spill response is required, in addition to standard health and safety procedures and policies.

The term "hazardous wastes" designates materials defined in 40 CFR Part 261.3 and are regulated under RCRA. Hazardous wastes are regulated from the point of generation to the point of disposal. If less than 100 kilograms of hazardous waste is generated per month, the facility is considered a small-quantity generator. If 100 kilograms or more of hazardous waste is generated per month, the facility is considered a large-quantity generator.

The materials used at the existing operations at Rasmussen Ridge Mine are listed in **Table 2.2-6**. The Rasmussen Ridge Mine is considered a small-quantity generator because less than 100 kilograms of hazardous waste (solvents) are generated per month. Overburden produced from mine operations is exempted from hazardous waste regulations.

All hazardous materials and wastes would be stored and shipped in appropriate containers and labeled according to the U.S. Department of Transportation regulations for hazardous materials as provided in 40 CFR Parts 171-180. The transport of hazardous materials would be via regulated transporters. Currently, the primary route for transporting hazardous materials from Soda Springs to and from the Central Rasmussen Ridge Mine is via State Highway 34, Blackfoot River Road, and the existing haul road to the mine site. Transportation of hazardous materials and wastes associated with the Proposed Action would comply with federal regulations.

Under CERCLA, listed "hazardous substances" are defined as the elements, chemical compounds, and hazardous wastes appearing in Table 302.4, 40 CFR Part 302, Designation, Reportable

TABLE 2.2-6
HAZARDOUS MATERIAL INVENTORY

Material	Purpose for Use	Storage Location	Quantity Used/Day	On-Site Storage Quantity/Week	Waste Management
Diesel	Fueling heavy equipment	Shop area	10,000 gallons	37,120 gallons	Not Applicable
Gasoline	Fueling pickups and mechanics trucks	Shop area	100 gallons	2,000 gallons	Not Applicable
Oil	Lubrication of mining equipment	Shop area	500 gallons	5,800 gallons	Waste Oils Stored On-Site & Disposed Off-Site
Solvents	Parts cleaning	Shop	5 gallons	50 gallons	Waste Solvents Disposed Off Site
Waste Oil	Used motor oil	Shop	Varies	8,000 gallons	Waste Oils Disposed Off Site
Antifreeze	Cooling for mining equipment	Shop area	100 gallons	4,000 gallons	Waste Coolants Disposed Off Site
Mining Overburden	Phosphate ore recovery	Mine area	20,000 tons	120,000 tons	Not Applicable
Explosives -Prill -Emulsion	Overburden removal	Shop area Shop area	Varies Varies	60 tons 20 tons	Not Applicable Not Applicable

Source: Agrium 2002.

Quantities, and Notification. The reportable quantity for each listed hazardous substance is also provided in Table 302.4 of 40 CFR Part 302. Spills or releases of reportable quantities, and those that occur beyond the boundary of the facility, would be reported to EPA and appropriate local agencies as required by Section 101 (14) of CERCLA. For petroleum products, the reportable spill quantity is 25 gallons or more that is spilled onto the ground. Any quantity of petroleum product that is spilled into a stream is reportable. For 100 percent antifreeze (undiluted), the reportable spill quantity is 5,000 pounds or more.

“Hazardous chemicals” are defined in 1910.1200 (c) of Title 29 of CFR. Under 40 CFR Part 370, Hazardous Chemical Reporting: Community Right-to-Know, facilities that are required to have available a material safety data sheet for every chemical or hazardous material brought on site.

“Extremely hazardous substances” and the threshold planning quantities of each are listed in the appendices to 40 CFR Part 355, Emergency Planning Notification. The chemicals and materials typically used in surface mine development and operations are not classified as extremely hazardous substances.

“Toxic chemicals” are defined as those chemical listed in Subpart D of 40 CFR Part 372, Toxic Chemical Release Reporting: Community Right-To-Know, along with their reportable threshold amounts. For community right-to-know and emergency planning, facilities that use toxic chemicals in amounts over the defined threshold quantities are required to provide notification to

EPA. The chemicals and materials typically used in surface mine development and operations do not include toxic chemicals.

Oil is defined in 40 CFR Part 112, Oil Pollution Prevention, as "oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil." Oil storage facilities or tanks with more than 1,320 gallons of combined storage capacity, which are not buried, or with a single container with a storage capacity of more than 660 gallons, require a Spill Prevention Control and Countermeasures (SPCC) Plan in accordance with 40 CFR Part 112, Oil Pollution Prevention. Oil spills that may affect navigable waters must be reported to the EPA National Response Center as required by 40 CFR Part 110, Discharge of Oil.

Hazardous materials that are regulated must be stored at designated locations on site in approved containers. Spill containment structures must be provided for liquid hazardous materials that are stored on site.

An existing Storm Water Pollution Prevention Plan (SWPPP; Agrium 2002) is in place for the mine, providing management direction for preventing and controlling potential spills, describing the above ground tanks and secondary containment structures for bulk petroleum products, solvents, and antifreeze, identifying the routine monitoring requirements, and describing the BMPs for the pollutants of concern. The pollutants of concern are defined as any with potential to be released from the site and include sediment discharge from storm water runoff and fuels and oil from the vehicle maintenance shop. The SPCC for the mine is also incorporated in the SWPPP document.

All liquid petroleum products, solvents, and antifreeze at the project are currently stored in above ground storage tanks (**Table 2.2-6**). The existing secondary containment facilities have sufficient capacity to hold the entire contents of the largest tank within the storage area, including freeboard for precipitation. No significant spills or leaks of fuel have occurred during operation of the site (Agrium 2002).

Oil is changed and other equipment is maintained at the Rasmussen Ridge Shop (Agrium 2002). Used engine oil is stored on site and then sent to a recycling company located in Pocatello, Idaho.

2.3 ALTERNATIVE 1 - PROPOSED ACTION WITH IMPERMEABLE CAPPING OF BACKFILLED AREAS

Alternative 1 was developed to address the issue of the potential for selenium to leach into the groundwater. As phosphate mining has developed in southeast Idaho, concern for groundwater contamination has lead to the development of various BMPs to control potential selenium migration from the mines. An impermeable (low-permeability) cover over external waste rock dumps and over backfilled areas is perceived as a way to reduce infiltration into the materials and thus reduces the potential leaching of selenium from the materials. Analysis of the mobility of selenium under Alternative 1 presents information that can be compared with analysis of the Proposed Action. In this manner, the agency decision-maker can see the differences between the alternatives in the fate and transport of selenium and other potential contaminants.

This alternative is essentially the same as the Proposed Action except that Agrium would construct a layer of impermeable material between the seleniferous waste rock and the applied growth media to eliminate potential effects of water infiltrating into the backfill. This type of layer would be constructed on backfill slopes shallower than the proposed 3.0h:1.0v to avoid slope failures. A 4.0h:1.0v slope would be appropriate to construct such a layer (BLM, USFS, and USACE 2000). **Figure 2.3-1** illustrates the conceptual construction of 4.0h:1.0v slopes in cross-section, and **Figure 2.3-2** shows the areas in plan view where 4.0h:1.0v slopes would be constructed (Central Rasmussen Ridge backfill area F, and North Rasmussen Ridge backfill areas A, B, and C).

Designing the backfill slopes at a 4.0h:1.0v would decrease the available volume in Central Rasmussen backfill area F by a critical amount. This would cause the progression of backfill to catch up to the progression of mining. The consequence would be the need to create an external waste rock dump (outside of the perimeter of the pit) to contain the lost capacity in backfill caused by the reduced backfill slopes. In turn, the total area of disturbance outside of the perimeter of the pit would increase by 26.4 acres (**Figure 2.3-2**), thus increasing the cumulative impacts of the area. The external waste rock dump would likely include forested lands and other habitats, both on and off the leases.

Some miscellaneous costs associated with the external dump (that were not evaluated in this analysis) are the purchase of timber, pre-stripping and hauling of slash and growth media, and water management and silt retention structures. Off lease Special Use Permits for mine waste dumps can no longer be obtained from the USFS. As a result, a lease modification would be proposed to the BLM.

Two different kinds of materials were evaluated for this alternative: natural clay, and synthetic liners. The following sections describe constructing the alternative with the different materials.

2.3.1 Clay Cap Design and Costs

Construction of an impermeable clay cap on 4.0h:1.0v backfill slopes would start with preparation of a sub-grade or base for the clay. The sub-grade would be constructed with compacted, 4-inch minus limestone. This limestone would be hauled from the active mining area to a mobile screening plant, where it would be sized and then hauled to the resloped backfill area as sub-grade material. The sub-grade material then would be moved into position with a dozer and compacted with a sheep’s foot roller pulled behind another dozer. The final compacted sub-grade would be 1 foot thick.

The clay to be used for the impermeable cap would be excavated and hauled to the backfill area. Suitable clay is not found near Rasmussen Ridge; therefore, it is assumed that suitable clay would be found and excavated on Agrium’s privately owned land in Wooley Valley, southwest of the tipple. If the clay is not found, Agrium’s cost would increase substantially. The required volume of clay to cap the backfill is estimated at 360,000 bank cubic yards (bcy) and would be extracted from a 35-foot-deep pit. The configuration of the pit assumes that the upper 15 feet of material is unusable alluvium that would be discarded near the pit site. Total disturbance associated with the pit would be about 25 acres. Costs for materials testing, site preparation, and any state or local permits and reclamation plans are estimated at $250,000. Mining and hauling costs from the clay

Figure 2.3-1 Conceptual Pit Backfills with Impermeable Layers

pit to the backfill areas (approximately 9 miles) are estimated to be $3.9 million. The clay would be pushed into place with a dozer and compacted with a sheep's foot roller pulled by another dozer. The final layer of compacted clay would be 1-foot thick.

After placement of the clay layer, a 1-foot thick layer of graded limestone would be placed to act as a lateral drain off the backfill area. Limestone would be hauled from the pit to a screening plant where the 2-inch to 4-inch material would be screened off for use as drain material. A dozer would move the drain material into place. The material would need a high level of hydraulic conductivity to act as a drain; therefore, no compaction of this material would take place. The lateral drain would allow water to rapidly drain away from the clay cap so there would be no build up of hydraulic or pore pressure in or above the clay layer. The drain would also reduce the time that water is contained in the system and thus reduce the potential for water to infiltrate into the backfill.

The final step would be to place a minimum of 2 to 3 feet of growth media over the lateral drain. The growth media would be pushed into place with a dozer. Additional dozer costs for placement of the growth media on a 4.0h:1.0v slope versus a 3.0h:1.0v slope are estimated at $15,326. A sheep's foot compactor and screening plant would be purchased. Itemized costs for design of the impermeable clay cap include additional costs to slope the backfill, construct the clay pit, mine and haul clay, place and compact the clay, mine, screen and haul limestone, place the lateral drain, and place the growth media. These itemized costs total $9.5 million over the cost of the Proposed Action. This alternative would disturb 51 additional acres for the clay pit and the external waste rock dump.

2.3.2 Synthetic Liner Design and Costs

Placing a synthetic liner on backfilled slopes would also require the slopes to be at 4.0h:1.0v. Preparing the sub-base for a synthetic liner is more critical than for a compacted clay layer. A limestone sub-grade would be placed using a dozer to push the limestone and a second dozer to pull a roller compactor. Sub-grade for a synthetic liner must be stable to support the liner and any material overlying the liner without allowing deformation and requires higher degrees of compaction and thickness of the sub-grade. The sub-grade must also be sized properly to eliminate any large components that might tear or otherwise compromise the liner. With these criteria in mind, the sub-grade would be prepared using 1-inch minus material compacted to a thickness of 3 feet. A non-woven pad would be placed directly on the sub-base and covered with the synthetic liner, and another non-woven pad would be placed above the synthetic liner to protect it from any unseen jagged edges and tearing from operating a bulldozer on it while pushing the additional cover materials.

A lateral drain, constructed of graded limestone, would be placed over the liner and upper non-woven pad. Limestone would be mined from the pit and hauled to a screening plant where 2-inch to 3-inch material would be segregated for use in the lateral drain. The lateral drain provides the same type of water control as was described with the clay liner. However, the lateral drain above the synthetic liner would be required to be 3 feet thick, rather than 1 foot thick as over the clay liner. This increased thickness would be necessary to provide a surface for dozers to work

Figure 2.3-2 Alternative 1 Final Reclamation Plan

(page two)

without damaging the underlying pad or liner. The last step would be placing growth media over the drain with a dozer.

Estimated costs for the use of a synthetic liner to cap the backfilled area would include sloping the backfill to 4.0h:1.0v; purchase of the 40 mil-thick liner and non-woven fabrics; purchase of a screening plant; mining, hauling and screening the limestone; placing the sub-base; installing the liner and lateral drain; and placing the growth media. Capital costs would include a roller compactor and a screening plant. These itemized costs total $20.7 million over the cost of the Proposed Action. This alternative would disturb an additional 26.4 acres for the external waste rock dump that would be located west of the pit.

2.3.3 Environmental Monitoring, BMPs and Reclamation

Because Alternative 1 is essentially the same as the Proposed Action with minor additional activities (construction of external waste rock dump, construction of clay quarry) all monitoring and BMPs and reclamation procedures described in section 2.2.3 would be applied to this alternative as well. Additionally, if a clay quarry would be required, a reclamation plan would be prepared as part of the permitting process.

2.4 ALTERNATIVE 2 – NO ACTION

A No Action Alternative would preclude mining or any associated development in any of the North Rasmussen Ridge areas. However, the No Action Alternative would not provide the required ore for Agrium’s processing plant and would leave the mineral resource unusable. Furthermore, Agrium has determined that the mineral reserves are economically recoverable and that holding valid leases for the North Rasmussen Ridge mineral rights provides the right to recover the minerals.

The No Action Alternative would involve continued mining at the Central Rasmussen Ridge mine until all ore was recovered. This mining effort would involve disturbance of 231 acres and reclamation of 196 acres, or 85 percent of the disturbed area. The Central Rasmussen Ridge pit would not be backfilled, but would remain in an unreclaimed state as per the approved mine plan. The external waste rock dump at Central Rasmussen Ridge would cover 36.3 acres. **Figure 2.1-2** - Existing Operations presents the facilities that are representative of activities under the No Action Alternative.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED EVALUATION

2.5.1 Continuous Mining from South to North

This alternative would involve mining North Rasmussen Ridge from south to north along the length of the strike in an uninterrupted, continuous manner. This alternative would be beneficial to waste rock haul distances and optimization of the cost of mining. However, it would also leave an open pit at the end of mining in the Reese Canyon drainage, which would in turn affect the watershed of the drainage and leave uncovered pit walls. Other consequences of leaving an open pit in Reese Canyon are the likely development of a post-mining pit lake through infiltration of groundwater and possible visual impacts from the Henry Cutoff Road. The potential adverse effects in Reese Canyon Creek eliminated this alternative from further analysis.

2.5.2 Continuous Mining from North to South

This alternative would involve mining North Rasmussen Ridge from north to south in an uninterrupted manner. This alternative would require excessive long hauling of waste rock from the north end of North Rasmussen to the Central Rasmussen pit for disposal. This long haul could be avoided by the construction of external (outside of the pit backfill area) waste rock dumps. The entire East Road would be constructed before mining begins and would be maintained during the entire mining sequence of North Rasmussen. The longer use of this road would increase the environmental impacts, such as dust and exhaust emissions, as well as prolonged exposure to the streams. This alternative does not allow for a smooth transition into North Rasmussen from Central Rasmussen and could result in a loss of ore caused by sluffing of the Central Rasmussen end wall. The excessive waste rock haulage and long-term maintenance of the East Haul Road eliminated this alternative from further analysis.

2.5.3 Partial Backfill Mining

The easiest and most cost-effective method to deal with waste rock disposal from North Rasmussen Ridge would be to develop one or more external waste rock dumps and not backfill all overburden materials. However, this type of waste rock disposal on the North Rasmussen lease areas would not be appropriate or prudent based on several factors. Use of the external waste rock dumps would reduce the amount of the North and Central Rasmussen pits that would be backfilled and would consequently leave these pits open to accumulate both meteoric water and groundwater, and possibly form a post-mining pit lake. Remaining open pits and external waste rock dumps would also increase the potential for selenium and other contaminants to be released into the environment. A significantly larger area of disturbance would be developed, permitted, and maintained. Off-lease Special Use Permits for mine waste rock dumps are no longer available from the USFS and a lease modification would be required from the BLM.

2.5.4 Complete Backfill Mining

Effects on mining would be reduced if all mine pits could be completely backfilled. However, due to mine sequencing, the initial waste rock from North Rasmussen would be used to backfill the last pit of Central Rasmussen. This results in a shortage of material to backfill the last pit in North Rasmussen. An additional 100 to 200 acres of land disturbance would be required to obtain sufficient material to complete the backfill process. This disturbance would increase effects on vegetation, watersheds, and wildlife and the potential release of contaminants into surface and groundwater. These potential effects eliminated this alternative from further analysis.

2.5.5 Exposed Pit Crotch

This alternative would use the same plan of mining as the Proposed Action. However, Agrium would leave the pit crotch open and unreclaimed at the conclusion of the Panel B mining process. This alternative would leave 3,600 feet of the ore and center waste shales exposed from mine sections 17500N to 21100N. Meteoric water would not be controllable and could possibly produce a post-mining pit lake. Such a lake could contain elevated levels of selenium from the exposed ore and waste shales. This area also contains the highest walls in the Panel B pit. If the entire height of the pit wall were left open and exposed, the result could be post-mining wall failures that, as the wall raveled, could take with it excessive amounts of undisturbed ground outside the shell. Additional area disturbed by any wall failures would not be restored or reclaimed. This alternative would be the most cost effective in that no post-mining work would be performed on the open pit. However, the potential risks to water quality and pit wall failure were major deterrents to this alternative.

2.5.6 West Side Haulage Roads

Developing a system of haul roads on the west side of the North Rasmussen Ridge pit would be one alternative for transportation of ore and waste rock. However, the topography on the west side of the pit is significantly more rugged and provides less room between the pit crest and the boundary of the lease. A system of haul roads on the west side of the pit would intercept several drainages, which would increase the potential impact of the mine on the surrounding environment. A system of roads on the west side of the pit would be from 100 to 200 feet higher in elevation than the road on the east side. This change in elevation would mean that loaded haul trucks would have a higher climb from the pit bottom in their travel to the ore dumping location. The potential for additional environmental impacts in drainages on the west side, plus increased haulage costs, deterred the analysis of this alternative.

2.5.7 All Cut Pit Access Ramp

The development of an all-cut pit access ramp would provide adequate, reliable access to the middle and lower areas of the pit. However, the ramp would increase the waste rock stripping required by 1.0 to 1.5 million bcy. This increase in turn would likely impose the need to permit and construct an external waste rock dump. An all-cut ramp would also move the east pit crest approximately 100 feet east that, in turn, would push the East Road, around section 18000N, closer to the West Fork of Sheep Creek. This move could increase the potential for sedimentation and accidental spills to reach the creek. The potential adverse effects that would result from an external waste rock dump and increased proximity to West Fork Sheep Creek forced elimination of this alternative.

2.6 SUMMARY COMPARISON OF ALTERNATIVES

A summary of the key issues related to the Proposed Action and comparison of the Alternatives for each environmental resource is presented in **Table 2.6-1**. Detailed descriptions of impacts for specific resources are included in **Chapters 4 and 5**.

2.7 AGENCY PREFERRED ALTERNATIVE

The BLM preferred alternative is the Proposed Action.

TABLE 2.6-1
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
Geology, Minerals, Topography, and Paleontology	Modification of 269 acres of natural terrain.	Modification of 320 acres of natural terrain.	No terrain modified or mining activities beyond that approved for Central Rasmussen Ridge Mine. 35 acres of Central pit not reclaimed.
	Removal of phosphate resource.	Removal of the same amount of phosphate resource would occur under this alternative.	No phosphate would be removed from North Rasmussen Ridge.
	All overburden to be backfilled. 72 acres of pit would not be reclaimed.	External disposal of overburden would require 26 acres and a clay pit would need 25 acres.	No overburden generated at North Rasmussen Ridge.
	Minimum of 8 to 10-foot thick cap on all areas of seleniferous overburden disposal.	Overburden would be capped with impermeable layer and would be sloped at 4.0h:1.0v.	No overburden generated at North Rasmussen Ridge.
	Panel B partially backfilled to cover ore and center waste shale outcrops.	Panel B partially backfilled as in the Proposed Action.	No mining at North Rasmussen Ridge. A 35-acres open pit would remain at Central Rasmussen Ridge.
	Potential for paleontological resources to be destroyed.	Effects on paleontological resources would be the same as for the Proposed Action.	No effects on paleontological resources.
Air Resources and Noise	Shift air quality impacts from existing mine about 2 miles north.	Air quality impacts similar to Proposed Action.	Air impacts remain at Central Rasmussen Ridge area until mining ceases in 2003.
	Fugitive dust (516 typ) from handling overburden.	Same as Proposed Action with minor increase in fugitive dust from constructing the external dump and hauling additional covering materials.	No fugitive dust generated at North Rasmussen Ridge.
Water Resources	New road construction in No Name Creek, West Fork of Sheep Creek, and Reese Canyon Creek would cause temporary increased sediment load in intermittent sections of these drainages.	Sedimentation could be slightly higher than Proposed Action due to construction of external waste rock dump and clay quarry.	Impact to No Name and West Sheep creeks would remain at current levels. No impacts in Reese Canyon Creek.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
	Minimum 8 to10-foot thick cap on all seleniferous overburden would reduce migration of contaminants to surface and groundwater resources.	Impervious cap on backfill would slightly (10 to 20%) reduce migration of contaminants to groundwater over the Proposed Action.	No overburden would be produced after mining at Central Rasmussen Ridge ceases.
	Intermittent flow in West Fork of Sheep Creek, No Name Creek and Reese Canyon Creek would temporarily decrease 37, 11, and 31 percent, respectively, due to interception of runoff from mine areas. After mining the percentages would be 37, 3, and 4 percent, respectively.	Effects on intermittent flows would be the same as for Proposed Action.	Intermittent flow in West Fork of Sheep Creek, No Name Creek, and in Reese Canyon Creek would not be impacted beyond the effects from the Central Rasmussen Ridge Mine. If a pit lake forms at Central Rasmussen, it may have elevated levels of selenium.
	Disposal of seleniferous overburden would increase potential leaching exposure from infiltration in the backfilled areas A and B.	External overburden site (26 acres) would increase potential leaching exposure over the Proposed Action.	No overburden produced therefore no leaching due to mining.
	Potential for effects on springs fed by alluvial flow downgradient of the pit. Selenium levels may increase and flow rates may decrease.	Effects on springs would be similar to those in the Proposed Action.	No effects on springs.
	Groundwater quality would be impacted due to the COPCs in the overburden in the backfilled pits. Re-charge through the backfilled pits into the underlying bedrock would be increased. No impacts to human health, vegetation or animals are expected.	Effects on groundwater would be slightly less than the Proposed Action (10-20%).	No groundwater impact would occur. No increase in recharge to the bedrock would occur in the North Rasmussen Ridge area.
Soil and Watershed	Loss of soil productivity during salvage and replacement of growth media.	Loss of soil productivity during salvage and replacement increased in areas of external waste rock dump and clay quarry.	No soil impacts beyond those from Central Rasmussen Ridge Mine.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
	Approximately 269 acres of soil would be disturbed. Soil erosion within disturbed area is possible but controlled with BMPs.	Approximately 320 acres of soil would be disturbed. Soil erosion within disturbed area possible but controlled with BMPs.	No soils would be disturbed at North Rasmussen Ridge.
	Total reclaimed area of 197 acres, 72 acres of highwall unreclaimed and exposed.	Total reclaimed area of 248 acres, 72 acres of highwall unreclaimed and exposed.	No highwalls at North Rasmussen Ridge Area. No reclamation would be necessary.
	Minimum 8 to 10-foot thick cap of nonseleniferous materials and 2 to 3-feet of growth media would most likely prevent plant uptake of selenium and trace metals from overburden.	Effects on plant uptake of selenium and trace metals from overburden considered less than for Proposed Action because of impermeable cap.	No overburden generated
Vegetation, Wetlands, and Riparian Areas	Vegetation communities would be altered on 269 acres of new disturbance, including conifer - 69 ac., mixed aspen/conifer - 192 ac., and sagebrush - 8 ac.	Vegetation communities would be altered on 320 acres of new disturbance, including conifer - 69 ac., mixed aspen/conifer - 218 ac., and sagebrush - 33 ac. Other effects would be essentially the same as for the Proposed Action.	No vegetation impacts beyond those at Central Rasmussen Ridge Mine.
	Revegetation would replace forest and shrub communities with grass and forb communities except on 72 acres of highwall unreclaimed.	Revegetation would be the same as under the Proposed Action.	There would be no highwalls or removal of vegetation at North Rasmussen Ridge.
	Minimum of 8 to 10-foot thick cap would minimize plant uptake of selenium and trace metals from overburden.	An impervious cap would minimize plant uptake of selenium to a greater degree than under the Proposed Action.	No overburden would need to be capped.
Wetlands and Waters of the U.S.	No wetland areas would be directly affected. Indirectly, some wetlands may lose a portion of their water supply.	Potential effects on wetlands would be essentially the same as for the Proposed Action.	No wetlands would be impacted.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
	Culverts would be used to cross Reese Canyon Creek and No Name Creek of 100-feet and 700-feet in length, respectively.	Effects in drainages from culverts would be the same as the Proposed Action.	No new disturbance in drainages would occur.
	Intermittent flow in West Fork of Sheep Creek, No Name Creek, and Reese Canyon Creek would temporarily decrease due to interception of runoff from mine areas. Post-mining flow in Sheep Creek could be reduced by approximately 11%.	Changes in stream flows would be the same as for the Proposed Action.	No interception of any flow would occur from mining.
Terrestrial Wildlife	Direct loss of mixed vegetation habitat on 269 acres, displacing wildlife from direct impact areas. A total of 197 acres would be reclaimed.	Direct loss of habitat, mostly forest habitat, on 320 acres, displacing wildlife from direct impact areas. Reclamation would occur on 248 acres.	No habitat loss or displacement of wildlife would occur beyond that approved for the Central Rasmussen Ridge Mine.
	Temporary exposure of wildlife to elevated selenium levels in water and sediments of mine areas until 2011 or until reclamation is completed. Such exposure is considered to be a minor effect.	Temporary affects as for the Proposed Action.	No exposure of wildlife to elevated selenium levels beyond what may occur at Central Rasmussen Ridge Mine.
	Reclamation would replace natural plant communities with grass/forb communities on 197 acres of new disturbance, 72 acres of unreclaimed highwall could provide habitat for some species.	Reclamation would be the same as for the Proposed Action on 248 acres.	No disturbance of natural plant communities on North Rasmussen Ridge.
	Cover design on the backfill would most likely prevent selenium and trace metals uptake by plants thereby reducing potential for ingestion by wildlife.	Impermeable layer on backfill would reduce the potential for plant uptake and ingestion by wildlife by a greater degree than the Proposed Action.	No additional overburden would be produced beyond that approved for the Central Rasmussen Ridge Mine.
Fisheries and Aquatic Resources	Intermittent flow in West Fork of Sheep Creek, No Name Creek, and Reese Canyon Creek would temporarily decrease due to interception of runoff from mine areas. Post-mining flow in Sheep Creek would be reduced by about 11%.	Intermittent flows would temporarily decrease as for the Proposed Action.	Intermittent flow in area drainages would not be affected.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
	New construction would cause a temporary increase in sedimentation in intermittent portions of West Fork of Sheep Creek, No Name Creek, and Reese Canyon Creek.	Temporarily, sedimentation effects could be slightly greater than the Proposed Action due to increased disturbance area.	No sedimentation effects at North Rasmussen
	Selenium may affect fisheries through discharges to springs that have source areas intercepted by the pit.	Potential effects from selenium would be the same as for the Proposed Action.	No effects to surface waters or aquatic resources from selenium.
	The project would be in compliance with INFISH Riparian Management Objectives.	This alternative would also comply with INFISH.	No Action would not affect the Riparian Habitat Conservation Areas of the INFISH program.
Threatened, Endangered, and Sensitive Species	Exposure to concentrations of selenium and trace metals in water and vegetation is not expected to occur.	Effects of exposure to selenium would be the same as for the Proposed Action.	Elevated concentrations of selenium and trace metals in water and vegetation would not occur at North Rasmussen Ridge. If a pit lake forms at Central Rasmussen, it may have elevated levels of selenium.
	Goshawk, 3-toed woodpecker, boreal and flammulated owls and other sensitive species minimally impacted by clearing of 69 acres of conifers.	Effects of habitat reduction would be greater by 51 acres.	No clearing of conifer habitat would occur on North Rasmussen Ridge.
Grazing Management	Forage for grazing would be removed from 269 acres. Stocking rates on one allotment could be affected.	Forage for grazing would be removed from 320 acres.	No impacts to forage by mining.
	Forage for grazing would be permanently removed from 72 acres of unreclaimed highwalls.	Forage for grazing would be permanently removed from 72 acres of unreclaimed highwalls.	No highwalls would be created.
	Cover design over overburden would minimize selenium and trace metals for plant uptake thereby reducing potential for ingestion by livestock.	Impermeable cap design over overburden would make selenium and trace metals less available for plant uptake thereby reducing potential for ingestion by livestock.	No mining of overburden would occur.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
	Potential for noxious weed invasion on 197 reclaimed acres.	Potential for noxious weed invasion on 248 reclaimed acres.	No disturbance on grazing allotments. Loss of 35 acres of restored grazing lands at Central Rasmussen in unreclaimed pit area.
Recreation	Dispersed recreation and hunting on North Rasmussen Ridge would be temporarily halted until 2011.	Effects on recreation would be the same as for the Proposed Action.	There would be no additional restrictions on hunting or dispersed recreation in the North Rasmussen Ridge Area.
Visual Resources	Open pit mining of Panels A and B would not be visible to significant numbers of people or create substantial effects in remote Caribou County.	Visual effects would be slightly greater than the Proposed Action due to the 26 acre external waste rock dump and 25 acre clay quarry.	No mining would occur at North Rasmussen Ridge and visual effects at Central Rasmussen Ridge would be reclaimed after 2003.
	Large-scale visual changes to characteristic landscape, but would meet VQ objectives of Modification, Maximum Modification, or Low SIO.	Same effects as Proposed Action.	Same effects as Proposed Action without reclamation of Central Rasmussen final pit.
Land Use and Access	Impacts of traffic volume to and from the mine on existing roads would not be changed from current conditions.	Impacts would be the same as for the Proposed Action.	Impacts of traffic volume to and from the mine would be reduced starting around 2003 when mining at Central Rasmussen Ridge would cease.
Cultural Resources	No direct impacts to any NRHP eligible sites.	No direct impacts to any NRHP eligible sites.	No cultural resources would be disturbed at either Central or North Rasmussen Ridge.
Social and Economic Resources	Annual impact to socioeconomic resources would be same as current conditions until approximately 2011 when mining and reclamation is completed. Agrium contributes up to 15 percent of the property taxes in Caribou County, plus other taxes and fees.	Annual beneficial impacts would be the same as for the Proposed Action.	Annual beneficial impacts would continue until 2003 when mining at Central Rasmussen Ridge would likely cease. This could result in layoffs of employees and a reduction in local purchases.
	Costs associated with reclamation due to proposed mining includes additional costs for the rehandling of overburden to partially backfill the open pit.	Costs would be greater than Proposed Action due to costs for the impermeable layer and different designs, ranging from $9.4 to $20.7 million, depending on materials used.	Reclamation costs would not be necessary.

TABLE 2.6-1 (CONT.)
ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Resource	Proposed Action	Alternative 1 Proposed Action with Impermeable Cap on Backfill	Alternative 2 No Action Alternative
Environmental Justice	Issues associated with environmental justice would not be affected by the Proposed Action.	Issues associated with environmental justice would be the same as for the Proposed Action.	There would not be any issues associated with environmental justice.
Hazardous Materials	Annual use and handling of hazardous materials would be the same as existing conditions.	Annual use and handling of hazardous materials would be the same as for the Proposed Action.	Annual use and handling of hazardous materials would be the same as existing conditions until 2003 when mining at Central Rasmussen Ridge would cease.